**Project Experience of Brian A. Roth**
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## Summary of type and nature of projects:

**Broadcast video systems.** In the early 1980's, I was assigned the project of designing and constructing a "cuts only" offline video editing suite. Subsequently, I've engineered and installed a variety of other professional video systems, including multiple "CNN News"-style studios and control rooms. For additional details, please refer to pages 2-3 in this document.

**Recording, sound reinforcement and radio broadcast studio systems.** In the early 1970's I began my career in the radio broadcast business, then soon moved into allied fields, such as recording studios and sound reinforcement systems. I have extensive experience as both a recording and FOH ("front of house") PA systems mixing engineer. I have been involved with dozens of new studio construction, studio upgrades, and PA system projects as a systems engineer, equipment specifier, project supervisor, equipment installer and service technician. For additional details, please refer to pages 4-5 in this document.

**Video conferencing and presentation theater design and implementation.** In 1992, Ackerman McQueen Inc., Oklahoma City, OK, embarked on an ambitious series of construction projects at all of the company offices in the country in order to add a video conference/presentation theater to each location, eventually totaling eight facilities. Based upon the office's requirements, I engineered the audio, video, and control systems and selected the equipment for each installation, acted as a liaison with the design architects and building contractors, assisted with equipment acquisition and delivery, and supervised and/or performed the actual physical installation and wiring of the systems. For additional details, please refer to page 6 in this document.

**Personal Computer Systems.** With the purchase of a Compaq portable PC in 1983, I became an early adopter of the new technology. In 1984, I added a modem and went online via Compuserve and local BBS systems. I have nearly 30 years of extensive experience with a variety of hardware, software, and local/wide area networking products and have served as a technical support person for a variety of different businesses. For additional details, please refer to page 7 in this document.

**Business Voice and Data Systems.** Also in the early 1980's, I was assigned the task of recommending a new business telephone system for my employer. I studied telephone system technology, made my recommendations to the company's Executive Board, and supervised the installation of a new PBX. Since then, I have been involved with approximately two dozen business telephone system installations and upgrades. My activities have included system design and engineering, equipment selection/recommendation/approval, supervision of and performing system installations, service and troubleshooting, coordinating services with the Bell LECs, writing RFPs and then evaluating the proposals and bids from IXC carriers, call-cost accounting computer systems, and end-user support. I have been involved with a number of LAN and WAN (Wide Area Network) systems as designer, project supervisor, and installer. For additional details, please refer to pages 7-9 in this document.

**Electronic equipment design, assembly, and manufacturing.** I have engineered and built a variety of equipment, both analog and digital. For additional details, please refer to page 10 in this document.

**For a partial listing of my current and past clients**, please refer to pages 11-12 in this document.

***Partial* listing of design engineering and installation/project supervision of broadcast television facilities.**

2009. OklaVision.TV, Oklahoma City, OK. Engineered and installed a 1080i high-definition studio (the successor to TravelNet.com, described later in this section) that produces 1-hour-per-weekday variety shows which are streamed on the internet, and simulcast on Cox Cable. The original Ross Synergy 100 SDI production switcher was upgraded to 1080i high-definition standards, and new Panasonic broadcast cameras were added. A high-definition two-channel Compix character generator and a high-def two-channel 360 Systems video server were included. Video support equipment includes Everetz and AJA routing, distribution, and conversion units.

2009. NRAnews.com, Washington, DC. Engineered and installed an entirely new, 1080i high definition studio to replace the older analog facility (see below). Live, three-hours-per-weekday shows are streamed in high-definition via the internet, with audio simulcast on Sirius satellite radio. Live video switching is handled by a Ross Synergy 100, along with with Everetz and AJA video/routing/ conversion support equipment. Installed new Panasonic and Sony broadcast cameras with robotic controls and teleprompter.

2008. CleanSkies.TV. Oklahoma City, OK and Washington, DC. Engineered and installed facilities in both cities for a news/talk television network (streamed via the internet) which produced eight 15 minute live shows per day. All video systems were 1080i high definition, with a Ross Synergy 3 video production switcher in Oklahoma and a smaller Ross Synergy 100 switcher in Washington. Support equipment in both locations included a two-channel Chyron character generator, Ross video server, Everetz and AJA video routing/distribution equipment, and a Trilogy VOIP intercom system for talent IFB and production crew "PL" functions in both locations. Qvidium codecs linked the two studios via dedicated T-1 digital circuits. Each site included Panasonic and Sony broadcast cameras, some equipped with robotics and teleprompters. Audio in Oklahoma City was mixed via a Yamaha PM-5D console.

2007. TravelNet.com, Tulsa OK. Engineered and installed a two-studio live news facility, with the programming streamed on the internet and simulcast via Cox Cable. This studio produced six live, 2 hours-per-day shows with interviews, live music performances, and feature packages to promote tourism in Oklahoma. On-air video switching was handled by a Ross Synergy 100 production switcher, with audio controlled by a Crest console with a secondary Mackie console during live music performances which were produced in the performance theater studio. Multiple remote sites were supported with Polycom codecs and RTS Chronus intercom/IFB connections.

2004-2005. NRAnews.com, Washington, DC. Engineered and installed a three camera "live talk show" facility. Three hours per weekday of programming is streamed on the internet, with audio simulcast on Sirius satellite radio. The show's host performed his own on-air video switching with a Panasonic MX-50 located at his announce position on the set.

2002. Washington, DC Bureau of Energy News Live. Engineered and installed a small studio that provided hourly updates to the main Energy News Live operations in Tulsa (see next page) via a dedicated Vyvx broadcast loop. It was a two-camera facility which also included the necessary intercom (RTS) and IFB equipment for the air talent and technical personnel to be connected via dialup phone lines to the Tulsa studio.

2001. Houston, TX Bureau of Energy News Live. Engineered and installed. This studio was essentially a duplicate of the Washington, D.C. studio described above.

2000. Energy News Live, Tulsa, OK. Engineered and installed. This facility produced nine 15-minute newscasts each weekday targeted to the energy industry and was distributed via a high speed video stream on the internet at energynewslive.com (now no longer in operation). Three Sony studio cameras with teleprompters and Vinten robotic controls, and eight smaller Panasonic 3 CCD cameras with robotic heads were switched via a Ross Synergy digital production switcher in conjunction with a 32x32 Sierra composite video router. Pinnacle DVE and CG, and a Leitch video server systems were included as well as an array of tape and other video support equipment. Talent audio was handled by eight Lectrosonic wireless microphones and a Wheatstone 40 x 8 bus broadcast audio console. An extensive system for both wired, wireless and telephone dial-in IFB and intercom was included, featuring Telex/RTS, Telos and Gentner equipment. The system also featured multiple patch bays for SDI video, composite video, RS-422 control, and audio subsystems.

1999. Ackerman McQueen, Tulsa, OK. Relocated Avid editing system to new area of building and integrated equipment with new video conference center control room.

1998. Ackerman McQueen, Oklahoma City, OK. Engineered and installed the upgrade of the main audio/video router to new Sigma 64x64 model with capacity for new equipment that was being added, and supervised the rewiring of the control room racks.

1996. Mercury Group, Alexandria, VA. Engineered and installed a hard disk video offline editing system for production of content for clients' website streaming video feeds.

1995. Ackerman McQueen, Tulsa, OK. Engineered and installed Avid online editing suite in conjunction with DigiBeta recorders.

1993. Ackerman McQueen, Oklahoma City, OK. Engineered and installed two Avid on-line suites with central electronics support systems, including a 32x32 Sigma AV router, and Sony Beta recorders.

1993. Ackerman McQueen, Oklahoma City, OK. Engineered and supervised the installation of a building-wide audio and video routing/distribution infrastructure to link various internal facilities located on multiple floors of the office tower.

1984. Ackerman McQueen, Oklahoma City, OK. Reinstalled offline system in new office facilities.

1983. Ackerman McQueen, Oklahoma City. Engineered and installed a ¾" offline editing suite with JVC decks (later upgraded to Sony BVU series machines), and a custom built 8x8 AV router which I designed.

## *Partial* listing of recording and radio broadcast studio and sound reinforcement projects.

2012. Erick Alexander, Oklahoma City, OK. Designed and installed new input/output panels for a Tangent 2416 console, and performed total system tests and needed upgrades/repairs.

2011-2012. Golden Voice Studios, Ackerman McQueen, Oklahoma City, OK. The entire recording complex was relocated from it's original space to new facilities within the same building. I engineered the wiring systems and co-installed the new studios.

2011. Watershed Recording, Enid, OK. Engineered and installed all wiring infrastructure at new studio location and assisted in the reinstallation of the equipment into the new facility.

2011. Gilberto Gless private studio, Mexico City, DF. After dismantling the Amek 9098 desk which had been installed at Studio 1117 (Salina, KS), I traveled to Mexico City to engineer and install the entire facility, and re-install the Amek console.

2010. Bays Brothers Studio, Chandler, OK. Reinstalled the Otari Concept-One console which had been purchased from Golden Voice Studios.

2010. Golden Voice Studios, Ackerman McQueen, Oklahoma City, OK. The analog studio system was replaced with new digital equipment, including an Avid Command-24 control surface. I engineered and installed the entire new facility.

2009-2010. Studio 1117, Salina KS. The studio had acquired a large Amek 9098 (96 input/48 output) which was purchased in "As-Is" condition. After extensive repairs, I restored all functions including the SuperTrue moving-fader automation and Virtual Dynamics.

2007. Sound Logic Studios, Lafayette, IN. The studio's DDA DCM-232 console (digitally-controlled analog) had suffered a total failure of the central control system and electronic metering. After extensive troubleshooting and repairs "down to the component level", I restored all major functions.

2007. Analog 2.0 Studios, Oklahoma City, OK. Engineered and installed entire new recording studio based around a TAC Matchless console, ProTools digital recording system, and an Otari MTR-90 multitrack recorder.

2006. Watershed Recording Studios, Enid, OK. Engineered and installed entire audio cabling system. Custom redesign of Neve 5106 recording console.

2006. Blue Heaven Studios, Salina KS. Major overhaul of Neve 5114 recording console.

2006. TCG Studios (Hanson Brothers), Tulsa, OK. Co-designed and installed major upgrades to existing studio.

2006. Oklahoma State Fairgrounds, Oklahoma City, OK. Co-designed and installed a new stereo playback system in the "Space Needle" ride.

2005. Studio 1117, Salina KS. Major overhaul of Trident 80-B recording console.

2004. NRAnews.com, Washington, DC. Engineered and installed "talk radio" suite for internet stream and Sirius Satellite radio channel program, along with live in-studio video streaming feed. System included a multi-line Telos ONE-six system for call-in participants, and a Telos Zephyr ISDN codec to "backhaul" the audio portion to the Sirius network center.

2003. Upstairs Productions, Oklahoma City, OK. System co-design and installation of new studio which is based around an Amek 9098i 72 input/48 output recording desk. Recorders included 48 channels of Avid 192HD and RADAR digital recorders, and analog MCI JH-24 multitrack and an Ampex ATR-100 1" stereo mixdown recorders.

2003. Bell Labs, Norman OK. Designed and installed entire audio system for new DDA 56 channel console with Studer 24 track analog and MOTU 24 channel digital recorders. Rebuilt DDA console due to multiple failures of switches, and failure of power supply.

1998. Sunbelt Studio, Oklahoma City, OK. 32 track ADAT, Mackie 8-Buss console. The original wiring infrastructure had significant problems and errors. Designed new cabling system and supervised the rewiring.

1993-1999. Ackerman McQueen, Oklahoma City, OK. Designed and installed four ProTools editing suites and associated electronics systems.

1995. Bill Hagans private studio, Tulsa, OK. After a catastrophic power supply failure of the Allen-Heath Sigma-series console, I performed a complete rebuild and system test of all 32 modules.

1993. Golden Voice Studio, Ackerman McQueen, Oklahoma City. The existing MCI recorder and console were replaced with a new 2" 24 track analog recorder and an Otari Concept console. Engineered the new cabling system, supervised and participated in the installation.

1993. KTNT radio, Oklahoma City. Engineered and installed a new on-air studio (with automation assist system for the air talent) and a new 4-track commercial production studio.

1991. The Church Studio, Tulsa, OK. The entire facility was dismantled (including the physical structure of the control room) and replaced by a new installation with a vintage Neve 8068 console, and a Studer A-800 24 track tape deck. Designed and installed the entire wiring system, performed some restoration/refurbishment and modifications of the Neve console.

1984. Golden Voice Studio, Ackerman McQueen, Oklahoma City. Relocated 24 track recording studio to new building.

1977. Maranatha Records, Santa Ana, CA. Engineered, constructed, and installed a custom 32 input/24 output custom recording console used by the record label.

1974-1978. Various small 4 to 16 track recording studios and sound reinforcement systems, Oklahoma and Texas. The studios were typically equipped with MCI or Tascam consoles and Ampex or Tascam recorders. In addition, I was part of a team that installed a number of sound systems in churches and auditoriums. I also designed and sold a number of portable PA systems to local and regional rock, country and gospel bands.

**System engineering/installation of video conferencing/presentation theaters for Ackerman McQueen, Inc.**

These multipurpose facilities consist of a very attractive, well-appointed main room where meetings and client presentations are held along with a separate control room for the electronic systems. Each installation typically included multiple Sony or Hitachi 3-chip CCD video cameras with robotics controlled by Panja/AMX equipment (I have written and modified AMX control software for these systems), multiple BarcoVision video projectors as well as 104" plasma monitors, various professional video and audio recorders (Sony and others).

In addition, each control room included audio/composite/HD video/computer video signal routers from Everetz, Sigma Electronics and Inline, two-way Vyvx network connectivity, and a professional grade multi-amped sound system with mixing console and the current best-available echo cancellation systems. Most of these facilities now include Polycom Viewstation (ISDN) video conferencing equipment for alternative connectivity instead of Vyvx. Photographs of some of these facilities can be found on the Ackerman McQueen website: **www.am.com**.

With each of these projects, I designed and engineered the electronic systems (video, audio, and control), selected the majority of the equipment, acted as coordinator with project architects and contractors, and served as the installation supervisor as well as performing actual installation tasks.

1999. Alexandria, VA. Two freestanding rear projection Barco projectors, two cameras, 16x16 AV router, EAW audio system, AMX touch screen controls for use by presenters in the room.

1999. Tulsa, OK. Five Barco projectors, five cameras, 32x32 router, EAW sound system, Crest audio console.

1997. Colorado Springs, CO. Single Barco projector, three cameras, 16x16 router, RCF and Digital Designs sound system, Amek/TAC audio console.

1996. Dallas, TX. Two Barco projectors, five cameras, 16x16 router, custom Digital Designs sound system, Amek/TAC audio console.

1994. Fairfax, VA. One Barco projector, three cameras, 16x16 and 16x8 AV routers, video wall with twelve monitors tuned to various broadcast news outlets. An AMX touch screen system allowed the user to instantly access any of the individual news feeds and redirect the program to a large screen Mitsubishi monitor, the Barco projector, or one of four VCR's.

1993. Tulsa, OK. One Barco projector, three cameras, 16x16 AV router, custom Digital Designs audio system.

1993. Dallas, TX. Interim, free-standing system with single camera and two large screen Mitsubishi monitors, 16x16 AV router.

1992. Oklahoma City, OK. Two Barco projectors, three cameras, 16x16 router, custom Digital Designs sound system, Amek/TAC audio console.

**Personal Computer hardware/networking/software and business telephone systems.**

I have extensive experience with constructing, configuring, and upgrading PC compatible systems dating back to the mid 1980's. Additionally, I am an experienced equipment troubleshooter with the ability to isolate malfunctions down to individual components at the board level in many instances.

My initial experience with Local Area Networks was with the Apple LocalTalk and the later PhoneNet cabling schemes as well as Ethernet 10Base-2 for PC compatible machines. In 1990, I was immediately impressed when 10Base-T was introduced because of its star topology (unlike the buss topology of LocalTalk or 10Base2) and the ability to use data grade (Category 3/5) twisted pair cabling. Thus, all new PC LAN designs with my involvement became strictly 10Base-T topology, and networks using Apple computers were adapted to function on the 10Base-T system as soon as appropriate hardware became available. I have designed, and in many situations installed, numerous LAN infrastructures ranging in size from under 10 to many dozens of ports.

A natural outgrowth of LANs is Wide Area Networking. In 1992, I investigated this type of connectivity for Ackerman McQueen, so all the company offices in the country, present and future, could be linked together into one seamless network. I designed a system utilizing Newbridge 3600 channel bank components in the main office in Oklahoma City with a private T-1 circuit to the carrier company. Some channels were configured for voice applications (discussed in the "Business Voice/Data" section of this document), but the bulk of the channels were allocated for data connections. At the remote ends, either a CSU/DSU for DDS-type circuits, or a Newbridge 3624 (and later, 3620) channel bank for fractional T-1 circuits were used.

Beginning with the addition of my first modem, I became quite familiar with serial communications and the RS-232 standard. This later proved to be useful as I designed systems using statistical multiplexers to tie clusters of remote terminals (or PCs running terminal emulation software) and serial printers to a host system at another location. Later, I was able to extend this knowledge into other RS-422 systems, such as commonly used in broadcast video control applications, and V.35 used in channel bank high speed data connections.

I have extensive experience with Microsoft operating systems, beginning with DOS 1.0 through various versions of Windows. Beginning in the late 1980's through the mid 1990's, I wrote and marketed a vertical business application (written in CA-Clipper) for pawnshops in my region, eventually making 16 installations. I have also written other custom applications and have supported some legacy applications (typically dBase) written by others. I have owned and used versions of DesignCAD to generate drawings for my various projects and have become experienced with scanners and various graphical formats and applications, including Adobe Acrobat.

Because of the equipment control requirements in the Ackerman McQueen video conference theaters, I am now experienced with Panja/AMX control system software and hardware.

I also served on the "Y2K" preparation committee at Ackerman McQueen during 1998-1999.

I've designed and installed multiple business telephone (PBX) systems with several supporting more than 200 users. Included with these systems were cost accounting and paging systems.

***Partial* list of business voice, data, and computer networking projects.**

1999. Ackerman McQueen, Oklahoma City OK and Dallas, TX. Assisted Williams Communications with installation of Cisco VOIP equipment to replace old voice muxes.

1999. Ackerman McQueen, Colorado Springs, CO. Project coordinator, replacement of Mitel SX-200 PBX with Nortel Meridian 11C PBX, including Companion wireless handsets and remote polling CDR system.

1999. Mercury Group, Alexandria, VA. Project coordinator, replacement of Panasonic 1232 hybrid key system with Nortel Meridian 11C PBX, including Companion wireless handsets and remote polling CDR system.

1999. Ackerman McQueen, Tulsa ,OK. Project coordinator, replacement of Mitel SX-200 PBX with Nortel Meridian 11C PBX, including Companion wireless handsets and remote polling CDR system.

1999. Mercury Group, Alexandria, VA. Supervised and assisted with the relocation of Panasonic KXT-1232 with voice mail to new office location. Installed new LAN with VPN router.

1999-2000. Ackerman McQueen, Oklahoma City and Tulsa, OK, Mercury Group, Alexandria, VA. Installed five Polycom Viewstation (ISDN) videoconference systems.

1998. Ackerman McQueen, Oklahoma City, OK. Project coordinator, replacement of Mitel SX-200D PBX with Nortel Meridian 44-C PBX, including Companion wireless handsets. Researched and installed polling CDR system for client bill-back reports locally and at future branch sites.

1997. Oklahoma Dental Association, Oklahoma City, OK. Acted as consultant to review existing telephone and computer systems and made recommendations for equipment upgrades, supervised installation of new Panasonic PBX and LAN cabling. Copy of the report available on request.

1997. Dr. Bruce Daniels, Oklahoma City, OK. Designed voice and LAN (and audio/video) infrastructure for a new house construction. Supervised and participated in the system installation.

1997. Ackerman McQueen, Oklahoma City, OK. Updated and revised 1994 Request For Proposals (RFP) and CAD system drawings covering the IXC portions of the current voice and WAN system. Met with representatives of the carrier companies and selected the new provider. A copy of this RFP is available on request.

1996. Ackerman McQueen, Colorado Springs, CO. Installed Mitel SX-200 with Panasonic cellular handset extensions, standalone CDR billing system, Newbridge 3620 channel bank, PCSI voice muxes to link PBX to Oklahoma City, and LAN with Novell router for WAN connection to other offices.

1996. Pro-Fab Mfg., Oklahoma City, OK. Relocated AT&T hybrid/key system to new headquarters/ factory building.

1996. Mercury Group, Alexandria, VA. Installed Panasonic KXT-1232 with voice mail and LAN in new office.

1996. Ackerman McQueen, Colorado Springs, CO. Installed Panasonic KXT-616 with standalone CDR cost accounting system and LAN in temporary office space.

1993. Ackerman McQueen, Fairfax, VA. Installed Mitel SX-100 PBX with standalone CDR cost accounting system and LAN.

1992. Ackerman McQueen, Oklahoma City and Tulsa, OK and Dallas, TX. Engineered and installed a Newbridge 3600 channel bank in Oklahoma City and 3624 channel banks in the other two locations with PCSI voice multiplexers to replace existing intercity voice tieline circuits and add WAN functionality via Novell Multiprotocol routers. Two to four channels in each channel bank were assigned for dedicated access outbound long distance, with a lower cost per minute compared to switched access calls. The PCSI muxes combined three voice channels plus a low speed (9600 BPS) data stream into one 64K channel. Within 15 months, the cost of a pair of the PCSI muxes was recouped from much lower monthly carrier charges. These have now been replaced by Cisco hardware operating with Voice Over IP. A system diagram is included with this document on page 10.

1992. Ackerman McQueen, Dallas, TX. Moved Mitel SX-200 PBX to new office space, installed LAN.

1991. Ackerman McQueen, Oklahoma City, OK. Upgraded SX-200 PBX to SX-200 Digital (2 cabinet) PBX to accommodate growth in office size.

1992. Wrote custom software for collecting call details from PBX or key systems to generate client billback reports. Base system was written using CA-Clipper with third-party libraries.

1989. American Collections, Oklahoma City. Subcontracted by Amtel Services to program new Mitel SX-200 PBX.

1987. Ackerman-Hood-McQueen, Tulsa ,OK. Replaced old Northern Telecom SL-1 PBX with Mitel SX-200 PBX and client billback CDR system.

1987. Ackerman McQueen, Dallas, TX. Replaced Intertel key system with Mitel SX-100 PBX.

1986. Ackerman McQueen, Oklahoma City and Tulsa, OK. Implemented interoffice PBX links via E&M tielines with services provided by MCI.

1986. Ackerman McQueen, Tulsa ,OK. Replaced old crossbar PBX/1A2 key system with Mitel SX-100 PBX and client billback CDR system.

1986. Ackerman McQueen, Washington, DC. Installed Mitel SX-20 PBX with client billback CDR system in new office.

1984. Ackerman-McQueen, Oklahoma City, OK. Supervised relocation of Mitel SX-200 PBX to new office location.

1982. Ackerman-McQueen, Oklahoma City, OK. Project coordinator, installation of Mitel SX-200 (with Superset desk sets) to replace old WECO crossbar/1A2 key system.

## Electronic equipment design, assembly and manufacturing.

I have designed and built dozens of audio, video and control devices. My experiences include actual circuit design, parts specification and acquisition, printed circuit layout and fabrication, and circuit assembly. I am experienced in packaging design, metal fabrication, and silk screening as well as other methods of panel legending.

Below is a *small* selection of a few of the more unique projects I have completed.

2003-Present. I have rack-packaged multiple mic preamplifiers and equalizers which had been removed from vintage recording consoles. Many examples are pictured on my website.

2000. Energy News Live, Tulsa, OK. The tally lights in the Panasonic robotic pan/tilt camera heads consisted of a small LED, which wasn't particularly visible to the on-air talent. I designed and built eight units that detected the light from the LED and activated a larger incandescent lamp, which did not require actual modification to the equipment, thus preserving the Panasonic warranty.

1993. Golden Voice Studio, Oklahoma City. The new Otari Concept console had provisions for only two sets of control room monitors, so I designed and built a FET-switched system for up to six pairs of speakers. Generated CAD drawings for use by the sheet metal fabricator to modify an existing blank "filler" in the console, laid out circuit boards and assembled the remotely-located switching unit.

1993. Golden Voice Studio, Oklahoma City. When the studio added their first ProTools computer editing system, they discovered a number of needed control room functions, normally found on a conventional recording console, were missing in the system. I designed and built a unit to provide multiple audio source selections, loudspeaker selector, plus cue and talkback functions.

1990. Amethyst Studios, Oklahoma City, OK. I engineered the electronic system for a four-channel cue system, designed the metal packaging, and supervised the assembly of the cue boxes.

1983. Ackerman McQueen, Oklahoma City, OK. At that time, there were no small, affordable audio/video routers available. Using a Panasonic video-only router as a basis, I engineered and built a 8x8 audio-follow-video (with breakaway) router for a new offline editing suite, including layout of printed circuit boards and design of the metal packaging units.

1977. Maranatha Recording Studios, Costa Mesa, CA. I performed the electronic engineering of a 32 input/24 output recording console, including all audio circuitry design and layout of all printed circuit boards. I coordinated with the metal design and fabrication company on the mechanical aspects of the console and supervised the small electronic assembly line that made the finished modules.

1974-1977. Cimarron Systems div. Of Ford Audio, Oklahoma City, OK. I designed the circuitry, printed circuit boards and metal packaging for a line of electronic crossovers, used in both sound reinforcement and recording studio applications. I designed the front and back panel legends and silk screen printed the panels. Approximately 100 of these units were ultimately manufactured. The original Tascam model 10 audio mixers had no provisions for monitor mixdown, nor any control room and studio controls. I designed the circuitry, printed circuit boards, designed the metal work, and panel legends, then assembled the circuitry and silk-screened the panels for six of these modules.

***Partial* Client list.**

**Oklahoma City, OK:**

Ackerman McQueen, Inc. Providing a variety of video, audio, and telcom technical services.

Upstairs Productions. Amek 9098i 72 channel console, 64 tracks ProTools, 48 tracks Radar recorder.

Studio Seven. MCI-equipped 24 track audio studio.

Analog 2.0 Studios. Analog Otari and digital Mackie recorders, TAC Matchless console.

Bell Labs Recording. Studer A-80 24 track recorder and DDA Profile console.

Bailey Audio. Sound reinforcement systems.

John Hendrix Company. Voiceover and commercial production studio.

Black Watch Studios. MCI JH-16/24 recorder.

Richard Corner/Soundwerks. Voiceover and dubbing studio.

Amtel Services. Business telephone and data sales and service company.

**Tulsa, OK and other Oklahoma locations:**

Church Studio, Tulsa. Neve and Studer 24 track recording studio.

Ripley Farms Studio, Pawnee, OK. Otari Concept-One console, Studer A-800 24 track.

Watershed Recording, Enid, OK. Neve 5104 console and studio design.

Bays Brothers Studio, Chandler, OK. Otari Concept-One console, studio design.

3CG Studios/Hanson Brothers, Tulsa. 24 track ProTools system with extensive outboard equipment.

Sounds Creative Studio, Tulsa. 24 track hard disk recorder, Soundcraft TS24 console.

Bill Hagans, Tulsa. Private 24 track analog recording studio, Otari machines and Allen-Heath console.

Emanon Records, Tulsa. Studer A-827 multitrack and Studer A-80 1/2" mixdown recorder.

## ***Partial*** **Client list (continued):**

### Other Locations:

Gilberto Gless , Mexico City, DF.  Private Studio.  Amek 9098 console, 96 input/48 output.

Studio 1117, Salina, KS.  Multiple recording desks and recorders.

Blackwater Studios, Cabot, AR.  MCI JH-416 console.

Magneto Mastering, Minneapolis, MN.  Multiple custom-built projects.

Mercury Group, Alexandria, VA.  Video editing studios, presentation theater, business phone systems.

Boyd Recording, Wylie, TX.  MCI JH-636 console and Studer A-80 24 track recorder.

Sound Logic Studios, Lafayette, IN.  DDA DCM-232 console.

Cider Mountain Studios, Athol, ID.  Custom rebuilding of "vintage" Ampex and Altec equipment.

ReelTime Studios, Denton, TX.  MCI recorders and SSL 4056 console.

Evergroove Studios, Evergreen, CO.  Soundcraft 6000 console.

Blue Heaven Studio, Salina KS.  Neve 5114 console.